

Mars Atmospheric Composition, Isotope Ratios and Seasonal Variations: Overview and Updates of the SAM Measurements at Gale Crater

We will summarize the in situ measurements of atmospheric composition and the isotopic ratios of D/H in water, $^{13}\text{C}/^{12}\text{C}$, $^{18}\text{O}/^{16}\text{O}$, $^{17}\text{O}/^{16}\text{O}$, and $^{13}\text{C}^{18}\text{O}/^{12}\text{C}^{16}\text{O}$ in carbon dioxide, $^{38}\text{Ar}/^{36}\text{Ar}$, $^{84}\text{Kr}/^{86}\text{Kr}$, and $^{15}\text{N}/^{14}\text{N}$ made in the martian atmosphere at Gale Crater from the Curiosity Rover using the Sample Analysis at Mars (SAM)'s Quadrupole Mass Spectrometer (QMS) and Tunable Laser Spectrometer (TLS). With data over 700 sols since the Curiosity landing, we will discuss evidence and implications for changes on seasonal and other timescales. We will also present results for continued methane and methane enrichment experiments over this time period. Comparison between our measurements in the modern atmosphere and those of martian meteorites like ALH 84001 implies that the martian reservoirs of CO_2 and H_2O were largely established ~4 billion years ago, but that atmospheric loss or surface interaction may be still ongoing.

References:

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